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Nicotine deprivation and nicotine reinstatement: effects upon a brief sustained attention task

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Investigations into the effects of nicotine upon human performance, of necessity, use nicotine deprived subjects. However, since nicotine deprivation leads to impaired performance, the interpretation of any performance change following nicotine is open to question: does the improved performance reflect a genuine improvement above the normal baseline, or does it reflect the reinstatement of performance levels found prior to deprivation? In order to answer this question, the effects of nicotine deprivation, and of nicotine reinstatement, need to be assessed within the same study. This has not been undertaken before, but was the aim of the present study. A secondary aim was to assess whether nicotine deprivation would be evident using only a brief attentional task, since previous research demonstrating performance decrements following nicotine deprivation had used prolonged tasks of 1-6 hours duration.

Twenty female nurses, all regular smokers (+15 cigarettes/day), were assessed on a brief letter cancellation task. Each response sheet contained 105 letter targets (60 high frequency, 30 mid frequency, and 15 low frequency). Following training, subjects were tested on four successive days. Days one and four comprised baseline days. Then either on day 2 (half the subjects) or on day 3 (other half of subjects), the volunteers agreed to abstain from smoking before testing (12+ hours abstinence). On the other three days normal smoking was permitted up to 30 minutes before testing. The first test session was given prior to smoking. This was followed by one cigarette, then a second letter cancellation test.

Performance was significantly impaired by nicotine deprivation, when assessed both by response time ($p < .05$) and target detections ($p < .05$). There was no evidence of a speed accuracy tradeoff; the correlation between target detection change and response time change was near to zero. On the second test following the cigarette, the performance of the previously deprived subjects returned to baseline, while performance remained unchanged in the other conditions. Throughout the experiment, there was no evidence of performance differences between the high, mid and low frequency targets. Overall therefore, nicotine deprivation led to an impairment in sustained attention, while reinstatement of nicotine led to performance close to baseline. There was no evidence of changed attentional selectivity, either during nicotine deprivation, or nicotine reinstatement.

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